FINAL REPORT

Microbiological Sampling Report

for

National Oceanic & Atmospheric Administration

Samplings Conducted in the Fourth Floor Computer Room
Building SSMC-4
on June 21, 2000

Interagency Agreement #: D8H00CO31200
Task: 9903

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Prepared by
US Public Health Service
Division of Federal Occupational Health
Bethesda Central Office

Executive Summary

At the request of the National Oceanic & Atmospheric Administration (NOAA), Federal Occupational Health (FOH) conducted a microbiological sampling in the fourth floor computer room of Building SSMC-4, located at 1305 East-West Highway, Silver Spring, Maryland. The sampling was conducted on June 21, 2000. Air (both Andersenâ and Zefonâ), swab, contact plate, and vacuum dust samples were collected from this room. Air samples were also collected from outdoors.

Findings are as follows:

· No fungal growth or fungal spores were detected from indoor air samples. Outdoor fungal levels were at 10^2 CFU/m^3 levels and spore levels at $10^3 – 10^4$ spores/m^3 levels.

· *Stachybotrys chartarum* was not detected from any air, swab, contact plate, or dust sample collected.

· Fungal burden on surfaces of supply diffuser, return trougher, and floor vent ranged from below the detection limit of 1 CFU/in^2 to 18 CFU/in^2.

· Fungal levels on horizontal surfaces of this room ranged from 2 CFU/plate to 25 CFU/plate with *Cladosporium* as the predominant fungal genera.

· The fungal level in carpet dust of this room was at 10^3 CFU/g of fine dust level with a diverse fungal population.

INTRODUCTION

At the request of the National Oceanic & Atmospheric Administration (NOAA), Federal Occupational Health (FOH) conducted a microbiological sampling in the fourth floor computer room of Building SSMC-4, located at 1305 East-West Highway, Silver Spring, Maryland. The sampling was conducted on June 21, 2000. Air (both Andersenâ and Zefonâ), swab, contact plate, and vacuum dust samples were collected from this room. Air samples were also collected from outdoors.

EVALUATION METHODOLOGY

Air Samples

Various types of samples were collected from this computer room on June 21, 2000. Two types of air samples were collected from this room: (1) culturable method using Andersenâ N-6 samplers at a flow rate of 28.3 L/min, and (2) non-culturable method using Zefonâ Air-O-Cell cassettes at a flow rate of 15 L/min. An indoor Andersenâ air sample was collected for 3 minutes and outdoor samples were collected for both one and three minutes. Two percent (2 %) malt extract agar (MEA) and cellulose Czapek agar (CCA) was used to recover general fungi and cellulose-loving fungi, respectively. A non-culturable air sample was collected in this room for ten minutes. Outdoor samples were collected for both five and ten minutes near the entrance of the building.

Contact Plate Samples

To determine fungal burden on horizontal surfaces of these rooms, six contact plate samples were collected from randomly selected horizontal surfaces. Sampling was conducted by pressing the MEA-filled Rodacâ plate against the surface of interest for five seconds.

Swab Samples

Swab samples were collected from surfaces of each supply diffusers, floor vents, and return troughers in this room. They were collected by wiping a known area of surface with a sterile cotton swab (Culturetteâ) wetted with holding media. Approximately 5 in^2 area was wiped for return trougher, 6 in^2 for floor vent, and 4 in^2 for supply diffusers. The swab was then placed directly into its holder. Each holder was labeled with an identifiable number. A total of eight swab samples were collected from these rooms.

Vacuum Dust Samples

A carpet dust sample was collected with a High Efficiency Particulate Air (HEPA) vacuum attached with a special “sock” device. A 3-ft by 3-ft area was vacuumed for at least five minutes.

All samples collected were sent for next morning delivery to FOH’s Environmental Microbiology Laboratory (EML) in Philadelphia, Pennsylvania for analysis.

Laboratory Procedures

Upon receipt, all Andersenâ air and contact plate samples were incubated in a 25˚C incubator. Each swab sample was suspended in sterile distilled water, diluted serially, and inoculated onto both MEA and CCA agar plates. At least three dilution series were used for each sample. The vacuum dust sample was sieved through a 250 mm sieve. The fine dust (< 250 mm) retrieved was then weighed and followed the dilution plating for fungal analysis.

All plates were incubated in a 25˚C incubator. They were examined every other day for up to 10 days to ensure the full recovery of fungi. Fungal identification was based on colony morphology, spores and conidia formation. Total fungal colonies formed on each MEA plate and *Stachybotrys chartarum* on CCA plates were counted and recorded. Fungal levels in samples were presented as colony forming units (CFUs) per measuring unit. For example, CFU/m^3 for Andersenâ air samples, CFU/in^2 for swab samples, CFU/plate for contact plate samples, and CFU/g of fine dust for vacuum dust samples.

All Zefonâ cassette samples were analyzed by the Environmental Microbiology Laboratory in Escondido, California for direct microscopic examination. Fungal spores were identified and their airborne levels were presented as spores/m^3.

RESULTS AND DISCUSSION

All laboratory analytical results from FOH's EML are presented in Attachment A in a laboratory report #NOAA-00-46R-C. Results from microscopic examination of Zefonâ cassette samples are presented in Attachment B. *Stachybotrys chartarum* was not detected from any sample collected.

Air Samples

Andersen Results

No fungal growth was detected from the indoor air sample. Outdoor airborne fungal levels were at 10^2 CFU/m^3 levels (Table 1). *Cladosporium* dominated outdoor fungal flora. Other fungi detected were *Alternaria, Epicoccum, Penicillium,* Ascomycetes, and Basidiomycetes.

Zefon Results

No fungal spores were detected from the indoor air sample. Total fungal spore levels outdoors were at $10^3 – 10^4$ spores/m^3 levels (Table 1). Basidiospores, Ascospores, and spores of *Cladosporium* dominated outdoor fungal flora. Other fungal spores detected from outdoors were *Alternaria, Epicoccum, Penicillium/ Aspergillus* types, and Smuts, Periconia, and Myxomycetes. Fungal spores detected indoors were similar to those of outdoors.

Swab Samples

Four of eight samples collected were below the detection limits (BDL) (3 CFU/in^2 for supply diffuser and 2 CFU/in^2 for return trougher). Fungal levels of other samples ranged from 3 CFU/in^2 to 18 CFU/in^2. Yeast and *Aureobasidium* dominated the sample collected from floor vent near plotter (sample #W15).

Table 1. Airborne fungal and spore levels in the 4th floor computer room of SSMC-4 on June 21, 2000.

Rooms **Parameters**	**computer room**	**Outdoors**
Airborne Fungal Levels (CFU/m^3)	<12	436* 742
Total Fungal Spores (Spores/m^3)	<7	11,194* 7,840

* Two samples were collected from outdoors.

Contact Plate Samples

Fungal levels ranged from 2 CFU/plate to 25 CFU/plate. *Cladosporium* and Basidiomycetes were the predominant fungal genera recovered. Other fungi detected were *Penicillium, Epicoccum, Alternaria, Aureobasidium,* and *Bipolaris.*

Vacuum Carpet Dust Sample

The fungal level in the fine dust of carpet sample was 5,200 CFU/g with a diverse fungal population. Fungi recovered were *Aspergillus, Aureobasidium, Alternaria, Cladosporium, Epicoccum,* and *Paecilomyces.*

CONCLUSIONS

· No fungal growth or fungal spores were detected from indoor air samples. Outdoor fungal levels were at 10^2 CFU/m^3 levels and spore levels at $10^3 – 10^4$ spores/m^3 levels.

· *Stachybotrys chartarum* was not detected from any air, swab, contact plate, or dust sample collected.

· Fungal burden on surfaces of supply diffuser, return trougher, and floor vent ranged from below the detection limit of 1 CFU/in^2 to 18 CFU/in^2.

· Fungal levels on horizontal surfaces of this room ranged from 2 CFU/plate to 25 CFU/plate with *Cladosporium* as the predominant fungal genera.

· The fungal level in carpet dust of this room was at 10^3 CFU/g of fine dust level with a diverse fungal population.

RECOMMENDATIONS

· Conduct a thorough cleaning of this room with HEPA vacuuming and wet-wiping.

· Implement an emergency water intrusion protocol for this building to adequately manage any unexpected water intrusion in order to prevent fungal proliferation.

ATTACHMENT A

Microbiological laboratory report #NOAA-00-46R-C for samples collected

from the fourth floor computer room at SSMC-4, on June 21, 2000.

ATTACHMENT B

Results from microscopic examination of Zefon air samples collected from fourth floor computer room at SSMC-4, on June 21, 2000.

USPHS DFOH ENVIRONMENTAL MICROBIOLOGY LABORATORY, PHILADELPHIA, PA

LABORATORY REPORT #NOAA-00-46R-C

Client agency: National Oceanic and Atmospheric Administration, Silver Spring, MD

POIS#/task #: D8H00CO31200 / 9903

Sampling date: 6/21/00

Dates of inoculation: 6/21/00 (air and contact plates), 6/22/00 (wipes), and 6/23/00 (dust)

General location: SSMC-4, Silver Spring, MD

Specific location: 4th floor, computer room

Sampling techniques: Air (Andersen N-6 sampler), contact plate, wipe, and vacuum dust samplings

Medium used: Malt extract agar (MEA) and Cellulose Czapek agar (CCA) for fungi

Samples submitted by: J. Sobelman

Date characterization completed: 7/4/00

(A) Air samples on MEA and CCA plates

Sample ID	Sampling Location	Air Volume (L)	Fungi on MEA @ 25°C	Presence of *Stachybotrys chartarum**** on CCA @ 25º C

A5	Computer room, center	84.9	No fungal growth CFU/m^3 < 12	No
OA1	Outside	84.9	1. *Cladosporium* (23*) 2. *Epicoccum* (4) 3. *Alternaria* (3) 4. *Paecilomyces* (1) 5. Ascomycetes (2) 6. Basidiomycetes (4) CFU/m^3 = 436	No
OA2	Outside	28.3	1. *Cladosporium* (11) 2. *Alternaria* (6) 3. *Epicoccum* (1) 4. *Penicillium* (1) 5. Basidiomycetes (2) CFU/m^3 = 742	No

Sample ID	**Sampling Location**	**Air Volume (L)**	**Fungi on MEA @ 25°C**	**Presence of *Stachybotrys chartarum**** on CCA @ 25º C**
SB	Shipping blank	NA#	No fungal growth	No

(B) Contact plate samples on MEA plates

Sample ID	**Sampling Location**	**Fungi detected on MEA @ 25°C**
CP17	Computer room, window ledge facing metro platform	1. *Cladosporium* (16) 2. Basidiomycetes (4) **CFU/plate = 20**

CP18	Computer room , top of computer table, center of room	1. *Epicoccum* (2) 2. Basidiomycetes (4) **CFU/plate = 6**
CP19	Computer room, top cabinet below fire alarm pad	1. *Cladosporium* (10) 2. *Penicillium* (6) 3. *Alternaria* (4) 4. *Bipolaris* (1) 5. *Epicoccum* (1) 6. Basidiomycetes (3) **CFU/plate = 25**
CP20	Computer room, table with copy paper	1. Basidiomycetes (2) **CFU/plate = 2**
CP21	Computer room, computer table near clock, center column	1. *Alternaria* (3) 2. *Cladosporium* (3) 3. *Aureobasidium* (1) 4. *Penicillium* (1) 5. sterile fungi (2) **CFU/plate = 10**

Sample ID	**Sampling Location**	**Fungi detected on MEA @ 25°C**
CP22	Computer room, top of cabinet	1. *Cladosporium* (1) 2. Basidiomycetes (4) **CFU/plate = 5**

(C) Wipe samples on MEA and CCA plates

Sample ID	Sampling Location	Area (in^2)	Dilution factor	Fungi on MEA @ 25°C	Presence of *Stachybotrys chartarum**** on CCA @ 25º C
LC	Lab control	NA	10X-MEA 10X-CCA	No fungal growth	No
W9	Computer room, supply outside 4213	4	10X-MEA 10X-CCA	No fungal growth CFU/in^2 < 3	No
W10	Computer room, return close to 4213 and column	5	10X-MEA 10X-CCA	No fungal growth CFU/in^2 < 2	No
W11	Computer room, floor vent near exit	6	10X-MEA 10X-CCA	No fungal growth CFU/in^2 < 2	No
W12	Computer room, floor vent near exit	6	10X-MEA 10X-CCA	No fungal growth CFU/in^2 < 2	No
W13	Computer room, supply near plotter	4	10X-MEA 10X-CCA	1. *Cladosporium* (1) 2. *Ulocladium* (1) 3. sterile fungi (1) CFU/in^2 = 8	No
W14	Computer room, return near plotter	5	10X-MEA 10X-CCA	1. *Cladosporium* (2) 2. yeast (2) CFU/in^2 = 8	No

Sample ID	Sampling Location	Area (in^2)	Dilution factor	Fungi on MEA @ 25°C	Presence of *Stachybotrys chartarum**** on CCA @ 25º C
W15	Computer room, floor vent near plotter	6	10X-MEA 10X-CCA	1. *Alternaria* (1) 2. *Aureobasidium* (1) 3. yeast (9) CFU/in^2 = 18	No
W16	Computer room, floor vent near plotter	6	10X-MEA 10X-CCA	1. *Alternaria* (2) CFU/in^2 = 3	No

(D) Vacuum dust sample on MEA and CCA plates

Sample ID	Sampling Location	Weight (g)	Dilution factor	Fungi on MEA @ 25°C	Presence of *Stachybotrys chartarum**** on CCA @ 25º C
V09	Computer room, carpet	0.100	40X-MEA 10X-CCA	1. *Aspergillus sp.* (5) 2. *Aureobasidium* (3) 3. *Alternaria* (2) 4. *Cladosporium* (1) 5. *Epicoccum* (1) 6. *Paecilomyces* (1) **CFU/g = 5,200**	No

* Colony counts. *** Toxigenic fungi. # Not applicable.